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A NEW SPECIES OF *EULITHIS* HÜBNER (LEPIDOPTERA: GEOMETRIDAE) FROM CALIFORNIA

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Abstract.—A new geometrid moth, ***Eulithis powellata***, of the subfamily Larentiinae, is described from Monterey County, California. It is most similar to the Eurasian *Eulithis mellinata* (Fabricius) and *E. pyraliata* (Denis and Schiffermüller), and its larva feeds on *Ribes menziesii* (Pursh) (Saxifragaceae). Although one of its Old World relatives, *E. mellinata,* has been introduced into eastern Canada, *E. powellata* is clearly distinct and apparently endemic to a small area of coastal California. Sixteen species of *Eulithis* are now known from North America, including two Eurasian introductions.

Key Words: Larentiinae, *Eulithis powellata, Ribes,* introduced species

This distinct and easily recognized moth is related to an Old World species group and closely resembles the Palearctic *Eulithis mellinata* (Fabricius) and *E. pyraliata* (Denis and Schiffermüller), both of which range across Eurasia from Britain and Norway to eastern Siberia. *Eulithis mellinata* was accidentally introduced into eastern Canada (Sheppard 1975, as *Lygris associata* Borkhausen; Neil 1978), but the Californian species is clearly different. It is larger, with the antemedial and postmedial lines of the forewing somewhat differently shaped and farther apart, the undersurfaces of the wings much more boldly marked (Figs. 1–3), and with conspicuous differences in the genitalia (Figs. 4–8). *Eulithis propulsata* (Walker), *E. luteolata* Hulst), a yellowish form of *E. destinata* (Möschler), and possibly *E. gracilineata* (Guenée) are the only other light-yellowish species of *Eulithis* that have been collected in California, and the new species is easily distinguished from all of them, as indicated in the description. At the time of writing, the generic placement of the new Californian species remains uncertain. According to one phylogenetic hypothesis, this species, together with the Eurasian *E. pyraliata* and the North American *Ecliptopera atricolorata* (Grote and Robinson), should be removed from *Eulithis* and referred to the otherwise Asian genus *Gandaritis* Moore 1868. The junior auther is addressing this problem in another paper (Choi, in press).

Sixteen species of *Eulithis* (sens. lat.) are now known from North America, including two Palearctic introductions—*E. mellinata,* mentioned above, and *E. prunata* (L.), recently reported also as being established in southern Quebec (Handfield 1997: 59, 93; Handfield 1999: 355).

This new species was investigated and described in manuscript by the two authors working independently, each without knowledge of what the other was doing until the accidental overlap came to light; thus the co-authorship.

Eulithis powellata Ferguson and Choi, new species

(Figs. 1–6)

Description.—Appendages of head and thorax structurally similar to those of other

Figs. 1–3. *Eulithis powellata*, adults. 1, Holotype male, dorsal view. 2, Holotype male, ventral view. 3, Paratype female, University of California Big Creek Reserve, Devil's Creek, 60–80 m, Monterey County, California, 3 August 1992, J. Powell, collector.

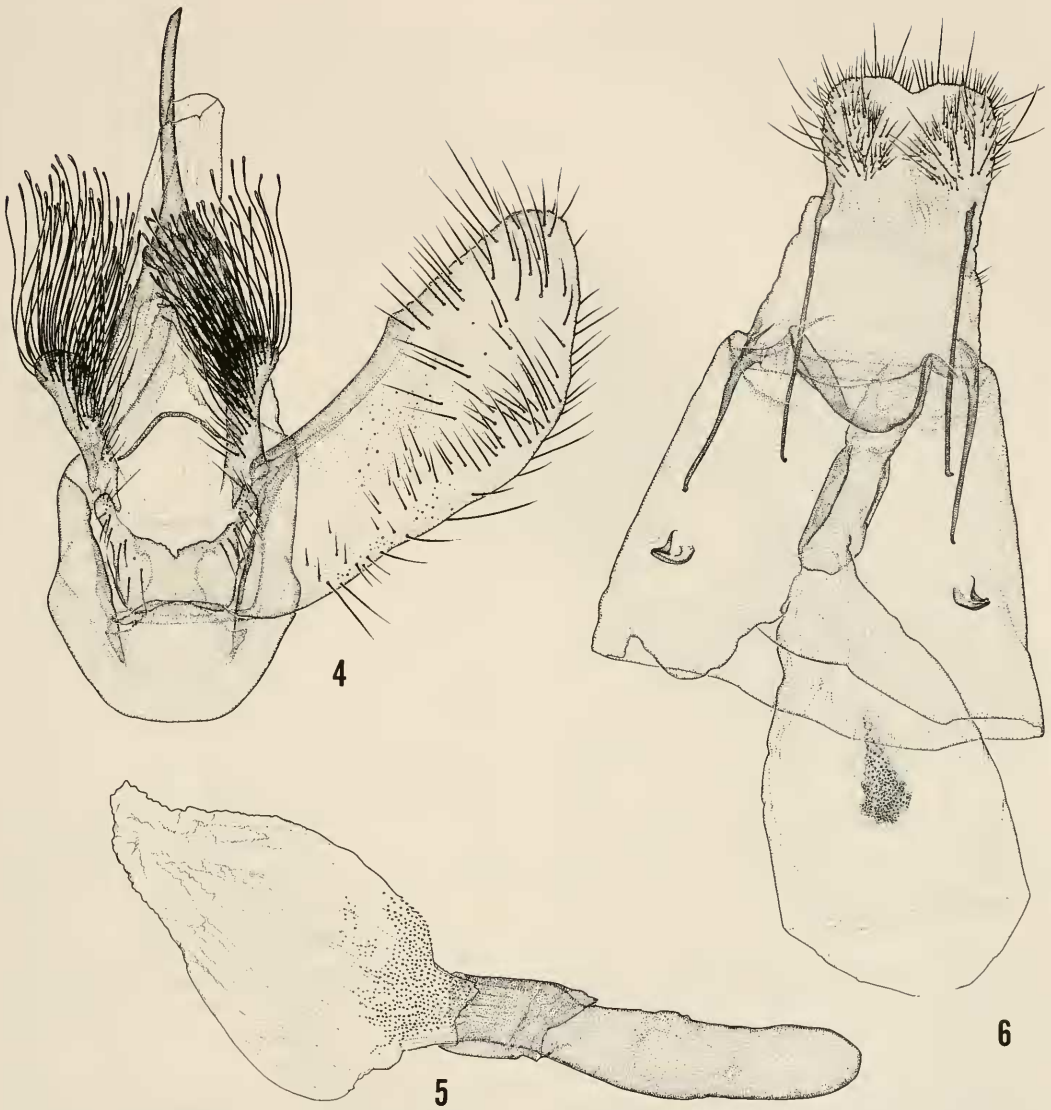
yellow species of genus; antenna of both sexes filiform, but that of male thicker and somewhat compressed; frons nearly flat but with a low, conical, mid-frontal crest of scales in fresh specimens; labial palp long in male, equal to 2½ times width of frons, equal to twice width of frons in female. Frons and palpi with mixture of yellowish and light reddish-brown scales; body yellowish; legs similarly yellowish but partly shaded with brown, particulary on inner sides of forefemur and tibia and on outer sides toward distal ends of all tibiae and femora, especially of males.

Forewing light ochreous yellow with three main transverse lines thin but distinct, brown, approximately right-angled as follows: antemedial line regular or finely crenulate, nearly right angled at longitudinal fold in discal cell; medial line nearly parallel to antemedial line, regular to slightly waved, similarly angled at longitudinal fold in discal cell and sometimes dentate at first anal fold; postmedial line usually regular, angled at M_3, with sections before and after that point each nearly straight. Subterminal band diffuse, pale, crenulate in middle of outer third, becoming faintly dark shaded at costa. Basal space shaded with brown near costa; space between antemedial and medial faintly brown-shaded toward middle; medial line with slight dark shading distad near costa, and postmedial line immediately preceded by similar brown shading between its angle and costa. Apical angle bisected by interface line separating a paler area costad from a darker area on side toward outer margin. Discal spot minute and inconspicuous, or absent. Veins thinly outlined with brown scales, especially between postmedial band and outer margin, more distinctly so than in any closely related Nearctic species. Fringes reddish brown on both wings, not or hardly variegated.

Hindwing pale ochreous yellow, with two gray or blackish, diffuse, wavy transverse bands, subparallel to each other and to outer margin, and with some reddish-brown marginal shading between outermost band and somewhat crenulate outer margin. These bands evident only toward inner margin and vary from faint to very distinct; they may represent medial and postmedial bands. Discal spot weak or absent.

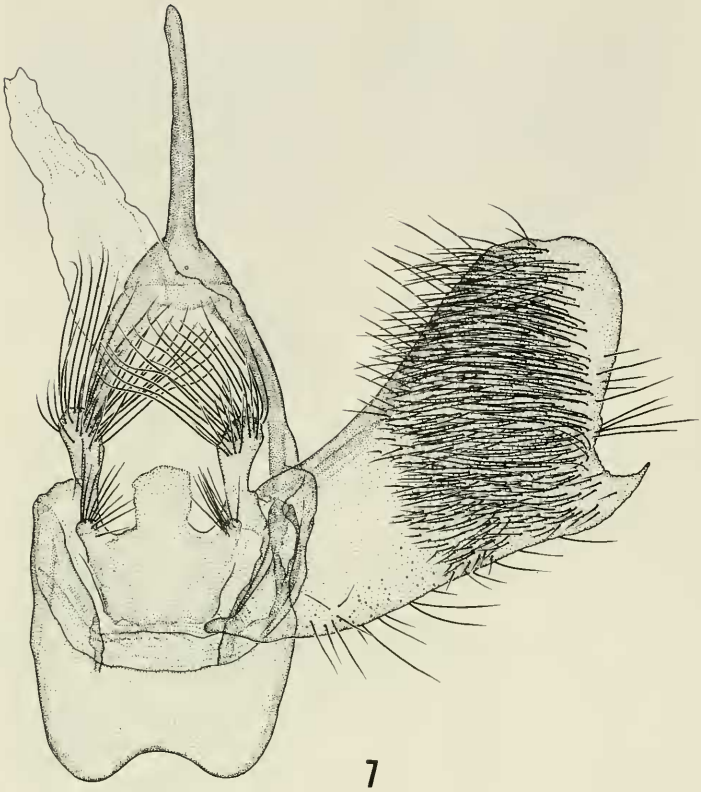
Undersurfaces of both wings a slightly deeper buff yellow; forewing with antemedial and postmedial lines strongly emphasized with dark brown on anterior half of wing, fading out posteriorly; subterminal band indicated by little more than a weak brown patch at costa; outer margin with large crescent-shaped brown patch just posterior to apex; discal spot obsolete. Undersurface of hindwing with same transverse bands as upperside, but complete from inner margin to costa, dark brown; medial band wide, double; postmedial band mostly broken into series of intervenular spots. Forewing length: holotype, 18 mm; other males, 15–18 mm; females, 17–19 mm.

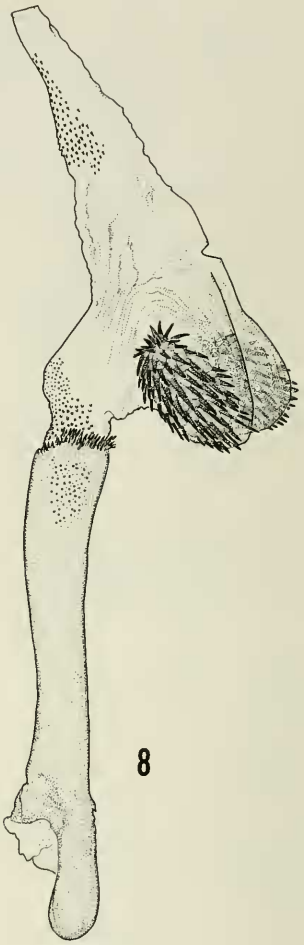
Male genitalia (Figs. 4–5) with valve simple, lacking dentate process on outer



Figs. 4–6. *Eulithis powellata,* genitalia. 4, Main part of male genitalia (paratype, USNM Slide No. 58872). 5, Aedeagus of same specimen. 6, Female genitalia (paratype, USNM Slide No. 58910).

margin characteristic of *mellinata* (Figs. 7–8), *propulsata,* and *luteolata* (that of *pyraliata* also without dentate process but differently shaped, with pointed, incurved apex). Vesica also simple, not scobinate, and without cornuti, in contrast to patches of cornuti present in other species, one in *propulsata,* two in *mellinata* and *luteolata,* and two or more in *pyraliata* (appearing as bundles of cornuti if vesica not everted). Also, setose, clavate, basocostal processes twice as long as those of *mellinata,* and even larger relative to those of some other species. Saccus convex and rounded in *powellata* as in most species, not emarginate as in both *mellinata* and *pyraliata.* Male genitalia closest to those of *Eulithis diversilineata* (Hübner) and *E. gracilineata* with respect to simple valve and vesica without cornuti. However, vesica of *powellata* not scobinate as in those two species. (This is a case in which the external appearance of





Figs. 7–8. *Eulithis mellinata* (Europe), male genitalia. 7, Main part of genitalia. 8, Aedeagus of same specimen.

the adult moth, plus food plant and female genitalia, may be more revealing with respect to relationship than are the male genitalia).

Female genitalia (Fig. 6) much as in *E. pyraliata* except corpus bursae essentially membranous, thickened only slightly toward posterior end. Also, signum of *powellata* a scobinate, elongate, conical plate with point directed toward ostium (i.e., posteriorly); that of *pyraliata* similar but smaller and more rounded. Ostium simple and membranous in *powellata* and most others examined, but scobinate in *mellinata.* Bursa copulatrix of *diversilineata* and *gracilineata* differs from those of *powellata* and others examined in having a longitudinal, wrinkled, bandlike signum running most of length of corpus bursae.

Early stages and host plants.—Several adults were reared from larvae found in May on *Ribes menziesii* Pursh (Saxifragaceae) by J. A. Powell and B. Scaccia. Data from field-collected adults show that the species is double brooded, flying in late May and June and again in August and early September. The bivoltine life history is consistent with that of the two common eastern yellowish species, *E. diversilineata* and *E. gracilineata,* although more northern

or montane species of *Eulithis* appear always to be univoltine and to overwinter in the egg stage. This is true of *E. mellinata* in northern Europe, where it also feeds on species of *Ribes,* and of *E. pyraliata,* which feeds on species of *Galium* (Rubiaceae) (Skou 1986: 92–95). Host information for other American species of *Eulithis* is fragmentary, although *E. propulsata* is thought to feed on *Ribes; E. diversilineata* and *E. gracilineata* feed on Vitaceae (especially on Virginia creeper, *Parthenocissus quinquefolia* (L.) Planch.); and other species have been variously reported on *Salix, Populus, Alnus, Betula, Physocarpus,* and *Vaccinium.*

Types.—Holotype ♂: California: Big Creek Reserve, U[niversity] C[alifornia] "NLWRS," Monterey County, California, 22 May 1992, J. Powell, collector; So. Ridge Rd., mixed hardwoods, 350 m. Paratypes (18): 1 ♂, same data and collector but taken at 500 m on 31 May 1997. 1 ♂, same data and collector but dated 3/5 Sept. 1991. 2 ♂, 1 ♀, same data but collected by R. Zunigo and J. Powell, 5 June 1992 [collectors' names not given on ♀]. 2 ♀, same locality, larvae found 17/18 March 1994, emgd. 22 April, 11 May 1994, reared from *Ribes menziesi,* J. Powell No. 94C26, J.A. Powell and M. McIntosh, collectors. 1 ♂, same data as holotype but collected at Brunette Creek, 60–180 m elev., 3 Aug. 1992; redwood-hardwood. 1 ♀, same data as for holotype but collected at Devil's Creek, 60–80 m, 3 Aug. 1992, J. Powell; redwood, hardwoods. 3 ♂, 3 ♀, 1 sex unrecorded, same locality as holotype (Big Creek Reserve), reared from larvae collected by B. Scaccia, as follows: from larva found 12 May 1992 on *Ribes menziesii,* emgd. 13 June 1992, J. Powell No. 92G74 (♂); from larva found 13 May 1992 on same host, emgd. 9 June 1992, J. Powell No. 92E209 (♀); from larva found 23 June 1992 on same host, emgd. 22 Aug. 1992, J. Powell No. 92F133 (♀); from larva found 13 May 1992 on same host, emgd. 3 June 1992, J. Powell No. 92E155 (♀); from larva found 13/15 March 1993 on same host, emgd. 30 April 1993, J. Powell No. 93C110 (♂); from larva found 13/15 March 1993 on same host, emgd. 1 May 1993, J. Powell No. 93C112 (sex not recorded); from larva found 24/26 April 1993 on same host, emgd. 14 May 1993, J. Powell No. 93D175 (♂). 1 ♂, Eden Vale, Monterey Co[unty), Cal[ifornia] [no date], collection W.H. Broadwell, Acc. No. 36961 (AMNH). 1 ♂, Bixby Canyon, Monterey Co[unty], Calif[ornia], 30 July 1949. J.W. Tilden, collector). Two additional specimens were taken on "the residential hill" in Carmel, Monterey County on 25 June 1969 by R.H. Leuschner; these are not included among the paratypes because we have not seen them. Holotype and nine paratypes deposited in Essig Museum of Entomology, University of California at Berkeley; eight paratypes in National Museum of Natural History, Smithsonian Institution, Washington, DC; and the last two paratypes listed are in American Museum of Natural History, New York.

Remarks.—This species is named after Jerry A. Powell, who collected it during a survey of the University of California Big Creek Reserve and sent specimens to the senior author for identification. This survey was the source of all known specimens except the two older ones found by the junior author in the American Museum of Natural History and the two reported by Leuschner. Larvae were first collected and reared and the foodplant established by Brian Scaccia, who assisted with the survey in 1992. The Big Creek Reserve is situated within the northern section of the Los Padres National Forest, near the Ventana Wilderness Area, and toward the southern end of the Santa Lucia Mountains, at about 36°05′N, 121°35′W. It appears that *Eulithis powellata* may exist only as this localized, relict population.

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acknowledge the contribution of Brian Scaccia in finding and rearing larvae, thus establishing the host plant. We also thank James Adams of Dalton, GA, Charles V. Covell, Jr. of Louisville, KY, and Ron Leuschner of Manhattan Beach, CA, for reviewing the paper. The genitalia drawings are by Lisa Roberts, who worked as a contract illustrator in the Systematic Entomology Laboratory, USDA.

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